

## Claims

- [1] A heat rod assembly for a pre-heater used in a vehicle, the heat rod assembly comprising:  
a channel type lower heat rod 110;  
an insulator installed at a bottom portion of the lower heat rod 110;  
a positive terminal 130 fixedly installed on the insulator 120 lengthwise along the insulator 120;  
a PTC device 140 coupled to the insulator 120 by interposing the positive terminal 130 therebetween; and  
an upper heat rod 150 for covering an opening section of the lower heat rod 110.
- [2] The heat rod assembly as claimed in claim 1, wherein an upper edge section of the lower heat rod 110 is inwardly bent such that the upper edge section covers an edge section of the upper heat rod 150.
- [3] The heat rod assembly as claimed in claim 2, wherein an inner width of the lower heat rod 110 is identical to an outer width of the insulator 120.
- [4] The heat rod assembly as claimed in claim 1, wherein the insulator 120 is formed with a bottom recess, which extends lengthwise along the insulator 120 in order to receive the positive terminal 130 therein.
- [5] The heat rod assembly as claimed in claim 4, wherein the insulator 120 is provided at both longitudinal ends thereof with fixing protrusions 123, which are inserted into coupling holes formed in the positive terminal 130.
- [6] The heat rod assembly as claimed in claim 5, wherein stepped recesses 124 are formed at both sides of the bottom recess 125 of the insulator 120, insertion protrusions 122 are formed in the stepped recesses 124, and a distance between the insertion protrusions 122 is identical to a length of the PTC device 140.
- [7] The heat rod assembly as claimed in claim 1, wherein the PTC device 140 is positioned on the insulator 120 corresponding to openings 121 formed in the insulator 120 by interposing the positive terminal 130 between the PTC device 140 and the insulator 120.
- [8] A pre-heater for a vehicle, the pre-heater comprising:  
a heat rod assembly 100 described in any one of claims 1 to 7;  
a heat pin assembly 200 formed at both sides of the heat rod assembly 100 in parallel to each other;  
a negative terminal 300 aligned in parallel to the heat pin assembly 200;

side frames 600 and 900 coupled to both sides of a coupling structure consisting of the heat rod assembly 100, the heat pin assembly 200 and the negative terminal 300; and

housings 400 and 800 for coupling the heat rod assembly 100, the heat pin assembly 200, the negative terminal 300, and the frames 600 and 900 with each other at front and rear portions thereof.

- [9] The pre-heater as claimed in claim 8 further comprising a coupling unit 500 laterally provided over middle parts of the heat rod assembly 100, the heat pin assembly 200 and the negative terminal 300 in order to couple the heat rod assembly 100, the heat pin assembly 200 and the negative terminal 300 with each other.
- [10] The pre-heater as claimed in claim 9, wherein the coupling unit 500 includes a clip capable of coupling the heat rod assembly 100, the heat pin assembly 200 and the negative terminal 300 with the side frames 600 and 900.
- [11] The pre-heater as claimed in claim 10, wherein the side frames 600 and 900 have a channel structure, both ends of the clip are bent such that the both ends of the clip are locked with flanges formed in upper portions of the side frames 600 and 900, and the housings 400 and 800 have coupling slots 450 and 850, respectively, for receiving end portions of the side frames 600 and 900.
- [12] The pre-heater as claimed in claim 8 wherein the heat pin assembly 200 includes a plurality of corrugate pins 210, which are fixedly arranged lengthwise along a pin plate 220.
- [13] The pre-heater as claimed in claim 8 wherein the heat pin assembly 200 is coupled with the side frames 600 and 900 by interposing a pin protecting plate 700 therebetween.